AMENDMENTS TO THE CLAIMS:

Please amend Claim 15 to read as follows:

1. (Previously Presented) A projection apparatus for projecting a pattern formed on a mask held by a mask stage onto a substrate, said projection apparatus comprising:

a charged particle beam source which emits a charged particle beam;

an irradiation system which has a shaping system for shaping the charged particle beam to have an arcuate cross-section and which irradiates the mask with the arcuate cross-sectional charged particle beam;

a projection optical system which projects the pattern onto the substrate, said projection optical system including a first unit having first and second magnetic lenses; and

a controller arranged to move a principal plane of said first unit in a direction of an optical axis of said projection optical system so that an image distortion of said projection optical system is corrected,

wherein said controller changes a distribution of an axial magnetic field generated by said first unit in the direction of the optical axis of said projection optical system to move the principal plane of said first unit by changing a ratio of currents to be respectively supplied to said first and second magnetic lenses.

2. (Cancelled)

3. (Previously Presented) The apparatus according to claim 1, wherein said projection optical system further includes a second unit having third and fourth magnetic lenses, and

wherein said controller is further arranged to change a ratio of currents respectively supplied to said third and fourth magnetic lenses to move a principal plane of said second unit so as not to change an image position and magnification of said projection optical system when moving the principal plane of said first unit.

4. (Previously Presented) The apparatus according to claim 1, wherein said projection apparatus further comprises an acquisition system which acquires image information indicating a feature of an image projected onto a substrate stage for supporting the substrate by measurement, and

wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses so as to correct an image distortion of said projection optical system on the basis of the image information.

5. (Previously Presented) The apparatus according to claim 4, wherein said acquisition system acquires image information containing information indicating a radius of an image formed on the substrate stage with the arcuate cross-sectional charged particle beam emerging from said shaping system.

6. (Previously Presented) The apparatus according to claim 5, wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses, so that the measured radius coincides with a theoretical radius obtained when said projection optical system has no aberration.

7. (Previously Presented) The apparatus according to claim 4, wherein said acquisition system acquires image information containing information indicating an image height of an image formed on the substrate stage with the arcuate cross-sectional charged particle beam that has passed through said shaping system.

8. (Previously Presented) The apparatus according to claim 7, wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses, so that the actually measured image height coincides with a theoretical image height obtained when said projection optical system has no aberration.

9. (Previously Presented) The apparatus according to claim 4, wherein said acquisition system comprises (a) an image distortion measurement mask having a transmitting system that passes therethrough a predetermined portion of the arcuate cross-sectional charged particle beam, said mask being held by said mask stage during measurement, and (b) a measurement unit for measuring coordinates of a position where the charged particle beam that has passed through said transmitting system becomes incident on the substrate stage, and

wherein said acquisition system calculates image information indicating a feature of an image projected onto the substrate stage on the basis of the measured coordinates.

10. (Previously Presented) The apparatus according to claim 9, wherein said image distortion measurement mask has a plurality of transmitting systems arranged arcuatedly, and

wherein said measurement unit measures coordinates of respective positions where charged particle beams that have passed through said transmitting systems become incident on the substrate stage.

11. (Previously Presented) The apparatus according to claim 10, wherein said acquisition system calculates a radius of an image projected onto the substrate stage on the basis of a plurality of measured coordinates, and

wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses, so that a radius obtained by measurement coincides with a theoretical radius obtained when said projection optical system has no aberration.

12. (Previously Presented) The apparatus according to claim 9, wherein said acquisition system further comprises a substrate having a mark, the substrate being placed on the substrate stage during measurement, and

wherein said measurement unit detects backscatter electrons from the substrate, thereby measuring coordinates of a position where the charged particle beam that has passed through said transmitting system becomes incident on the substrate stage.

13. (Previously Presented) The apparatus according to claim 12, wherein measurement of the coordinates of the incident position is performed while moving the substrate stage such that the mark moves across the position where the charged particle beam that has passed through said transmitting system becomes incident on the substrate stage.

14. (Previously Presented) The apparatus according to claim 13, wherein the mark is a crisscross mark made of a heavy metal.

15. (Currently Amended) A control method for a projection apparatus having a mask stage for holding a mask, a charged particle beam source which emits a charged particle beam, an irradiation system which has a shaping system for shaping the charged particle beam to have an arcuate cross-section and which irradiates the mask with the arcuate cross-sectional charged particle beam, and a projection optical system which projects ~~the~~ a pattern formed on the mask onto a substrate, the projection optical system including a first unit having first and second magnetic lenses, said method comprising:

an acquisition step of acquiring correction information necessary for correcting aberrations of the projection optical system; and

a control step of moving a principal plane of the first unit so that an image distortion of the projection optical system is corrected,

wherein said control step comprises changing a distribution of an axial magnetic field generated by said first unit in a direction of an optical axis of the projection optical system on the basis of the correction information to move the principal plane of said first unit by changing a ratio of currents to be respectively supplied to said first and second magnetic lenses.

16-28. (Cancelled)

29. (Previously Presented) A method of manufacturing a device, comprising the steps of:

fixing a mask on the mask stage of the projection apparatus according to claim 1;

placing a substrate on a substrate stage of the projection apparatus; and

transferring a pattern formed on the mask onto the substrate.

30. (Previously Presented) The apparatus according to claim 1, wherein said controller is further arranged to change the ratio of the currents respectively supplied to said first and second magnetic lenses so as to correct 3rd- and 5th-order image distortions of said projection optical system.

31. (Previously Presented) The apparatus according to claim 1, wherein said controller is further arranged to change the ratio of the currents respectively supplied to said first and second magnetic lenses under a condition that a sum of the currents respectively supplied to said first and second magnetic lenses is substantially constant.

32. (Previously Presented) The apparatus according to claim 3, wherein said controller is further arranged to change the ratio of the currents respectively supplied to said third and fourth magnetic lenses under a condition that a sum of the currents respectively supplied to said third and fourth magnetic lenses is substantially constant.

33. (Previously Presented) A projection apparatus for projecting a pattern formed on a mask onto a substrate, said projection apparatus comprising:

an irradiation system which irradiates the mask with a charged particle beam emerging from a charged particle beam source;

a projection optical system which has a magnetic lens and which projects the pattern onto the substrate; and

a controller arranged to move a principal plane of said magnetic lens in a direction of an optical axis of said projection optical system so as to adjust an image distortion of said projection optical system,

wherein said controller changes a distribution of an axial magnetic field generated by said magnetic lens in the direction of the optical axis of said projection optical system to move

the principal plane of said magnetic lens by controlling a current to be supplied to said magnetic lens.

34. (Previously Presented) The apparatus according to claim 33, wherein said controller is further arranged to adjust 3rd- and 5th-order image distortions of said projection optical system.

35. (Previously Presented) A projection apparatus for projecting a pattern formed on a mask onto a substrate, said projection apparatus comprising:

an irradiation system which irradiates the mask with a charged particle beam emerging from a charged particle beam source;

a projection optical system which projects the pattern onto the substrate, said projection optical system including (a) a first unit having first and second magnetic lenses and (b) a second unit having third and fourth magnetic lenses; and

a controller arranged to change a distribution of an axial magnetic field generated by said first unit in a direction of an optical axis of said projection optical system to move a first principal plane of said first unit in the direction of the optical axis of said projection optical system by changing a ratio of currents to be respectively supplied to said first and second magnetic lenses, and to change a distribution of an axial magnetic field generated by said second unit in the direction of the optical axis of said projection system to move a second principal plane of said second unit in the direction of the optical axis of said projection optical system by

changing a ratio of currents to be respectively supplied to said third and fourth magnetic lenses, so as not to change a magnification of said projection optical system while correcting an image distortion of said projection optical system,

wherein a moving amount of the second principal plane is equal to a value obtained by multiplying a moving amount of the first principal plane by a magnification of said projection optical system, and a moving direction of the first principal plane is the opposite direction to that of the second principal plane.

36. (Previously Presented) The apparatus according to claim 35, wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses and the ratio of currents to be respectively supplied to said third and fourth magnetic lenses under a condition that a sum of the currents respectively supplied to said first and second magnetic lenses is substantially constant and a sum of the currents respectively supplied to said third and fourth magnetic lenses is substantially constant.

37. (Previously Presented) The apparatus according to claim 35, wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses and the ratio of currents to be respectively supplied to said third and fourth magnetic lenses so as to adjust an image distortion of said projection optical system.

38. (Previously Presented) The apparatus according to claim 35, wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses and the ratio of currents to be respectively supplied to said third and fourth magnetic lenses so as to adjust 3rd- and 5th-order image distortions of said projection optical system.

39. (Previously Presented) A method of manufacturing a device, said method comprising the steps of:

transferring a circuit pattern onto a substrate using the projection apparatus of claim 33; and

developing the resultant substrate.

40. (Previously Presented) A method of manufacturing a device, said method comprising the steps of:

transferring a circuit pattern onto a substrate using the projection apparatus of claim 35; and

developing the resultant substrate.

41. (Previously Presented) A projection apparatus for projecting a pattern formed on a mask onto a substrate, said projection apparatus comprising:

an irradiation system which irradiates the mask with a charged particle beam emerging from a charged particle beam source;

a projection optical system which has a magnetic lens and which projects the pattern onto the substrate; and

a controller arranged to move a principal plane of said magnetic lens in a direction of an optical axis of said projection optical system so as to adjust an image distortion of said projection optical system, the image distortion being distortion caused by an error of a projected image position in a direction perpendicular to the optical axis of said projection optical system,

wherein said controller changes a distribution of an axial magnetic field generated by said magnetic lens in the direction of the optical axis of said projection optical system to move the principal plane of said magnetic lens by controlling a current to be supplied to said magnetic lens.

42. (Previously Presented) A projection apparatus for projecting a pattern formed on a mask onto a substrate, said projection apparatus comprising:

an irradiation system which irradiates the mask with a charged particle beam emerging from a charged particle beam source;

a projection optical system which has a magnetic lens and which projects the pattern onto the substrate; and

a controller arranged to adjust an image distortion of said projection optical system, said controller controlling a current supplied to said magnetic lens, changing a

distribution of an axial magnetic field generated by said magnetic lens in a direction of an optical axis of said projection optical system, and moving a principal plane of said magnetic lens in the direction of the optical axis of said projection optical system.

43. (Previously Presented) A method of manufacturing a device, said method comprising the steps of:

transferring the pattern onto the substrate using the projection apparatus of claim 42; and

developing the resultant substrate.

44. (Previously Presented) A projection apparatus for projecting a pattern formed on a mask onto a substrate, said projection apparatus comprising:

an irradiation system which irradiates the mask with a charged particle beam emerging from a charged particle beam source;

a projection optical system which has a magnetic lens and which projects the pattern onto the substrate; and

a controller arranged to adjust an image distortion of said projection optical system, said controller changing a distribution of an axial magnetic field generated by said magnetic lens in a direction of an optical axis of said projection optical system and moving a principal plane of said magnetic lens in the direction of the optical axis of said projection optical system.

45. (Previously Presented) A method of manufacturing a device, said method comprising the steps of:

transferring the pattern onto the substrate using the projection apparatus of claim 44; and

developing the resultant substrate.